Legionellosis

(Also known as Legionnaires' Disease and Pontiac Fever)

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1) THE DISEASE AND ITS EPIDEMIOLOGY

A. Etiologic Agent

Legionellosis is an infection caused by *Legionella* species, with *Legionella pneumophila* being the most common. Numerous serogroups are commonly recognized, although *Legionella pneumophila* serogroup 1 is most commonly associated with serious illness.

B. Clinical Description

Legionellosis has two distinct forms: Legionnaires' disease which is the more severe form of the infection, and Pontiac fever which is milder. The most common initial symptoms for Legionnaires' disease and Pontiac fever are anorexia, myalgia, malaise and headache. This is rapidly followed by fever (up to 102–105° F.), chills and a non-productive cough. Other symptoms may include abdominal pain and diarrhea. Legionnaires' disease is associated with pneumonia. The case-fatality rate overall is 5–30%. Pontiac fever is not associated with pneumonia or death and cases usually recover in 2 to 5 days without treatment. Legionnaires' disease usually cannot be distinguished from other forms of pneumonia and requires certain tests to confirm the diagnosis.

C. Reservoirs

Legionella is commonly found in the environment. It has been identified in many different kinds of water and water systems, such as hot and cold water taps and showers, creeks, ponds, whirlpool spas, and cooling towers and evaporative condensers of large air-conditioning systems. Outbreaks of legionellosis have been linked to these sources, as well as to decorative fountains, humidifiers, respiratory therapy devices and misters (such as those found in the produce section of grocery stores). These bacteria are most likely to reproduce to high numbers in warm, stagnant water. In this environment they often live as intracellular parasites of free-living amebae.

D. Modes of Transmission

Legionellosis is transmitted via the airborne route when aerosols are inhaled from a water source contaminated with the bacteria or through aspiration. Legionellosis is not known to be transmitted from person-to-person. There is no evidence to suggest transmission of *Legionella* from auto air-conditioners or household window air-conditioning units which do not use water as their coolant.

E. Incubation Period

The incubation for Legionnaires' disease is from 2 to 10 days, but most often 5 to 6 days. The incubation for Pontiac fever is from 5 to 66 hours, but most often 24 to 48 hours.

F. Period of Communicability or Infectious Period

Legionellosis is not communicable from person-to-person.

G. Epidemiology

Legionnaires' disease was named after an outbreak that occurred in Philadelphia in 1976, among people attending a convention of the American Legion. Legionellosis has a worldwide distribution with cases reported from North America, Australia, Africa, South America and Europe. An estimated 8,000 to 18,000 people get Legionnaires' disease in the United States each year. Most of these are single, isolated cases not associated with an outbreak. Outbreaks usually occur in the summer and fall, though cases occur year-round. Serologic surveys have shown a prevalence of antibodies to *Legionella pneumophila* serogroup 1 at a titer of $\geq$1:128 in 1–20% of the population. The illness most often affects older persons, especially those who smoke cigarettes or have chronic lung disease. Other risk factors include immunosuppressive therapy and immunosuppressive diseases,

such as AIDS and diabetes. *Legionella* is estimated to be responsible for between 0.5% and 5% of cases of community-acquired pneumonias.

2) REPORTING CRITERIA AND LABORATORY TESTING SERVICES

A. What to Report to the Massachusetts Department of Health

Report any of the following:

- Isolation of *Legionella* species from respiratory secretions, lung tissue, pleural fluid, or other normally sterile fluids; or
- Demonstration of a fourfold or greater rise in the reciprocal immunofluorescence antibody (IFA) titer to ≥128 against *L. pneumophila* serogroup 1 between acute and convalescent phase serum specimens; or
- Detection of *L. pneumophila* serogroup 1 in respiratory secretions, lung tissue, or pleural fluid by direct fluorescent antibody testing; or
- Demonstration of *L. pneumophila* serogroup 1 antigens in urine by radioimmunoassay or enzyme-linked immunosorbent assay.

Note: See Section 3) C below for information on how to report a case.

B. Laboratory Testing Services Available

The Massachusetts State Laboratory Institute, Reference Laboratory will test clinical specimens other than serum or urine for *Legionella* species by culture method. Testing for antibodies to *L. pneumophila* serogroup 1 in serum may be available in outbreak circumstances. For more information call the Reference Laboratory at (617) 983-6607. For epidemiologic purposes, the Viral Serology Laboratory will test paired samples (≥ 2 ml of sera) by IFA. For more information, call the Viral Serology Laboratory at (617) 983-6396.

3) DISEASE REPORTING AND CASE INVESTIGATION

A. Purpose of Surveillance and Reporting

- To identify sources of major public health concern (*e.g.*, a contaminated water source) and to stop transmission from such a source.

B. Laboratory and Healthcare Provider Reporting Requirements

Refer to the lists of reportable diseases (at the end of this manual's Introduction) for information.

C. Local Board of Health Reporting and Follow-Up Responsibilities

1. **Reporting Requirements**

Massachusetts Department of Public Health (MDPH) regulations (*105 CMR 300.000*) stipulate that each local board of health (LBOH) must report any case of legionellosis, as defined by the reporting criteria in Section 2) A. Current requirements are that cases be reported to the MDPH Division of Epidemiology and Immunization, Surveillance Program using an official CDC *Legionellosis Case Report* form (in Appendix A). Refer to the *Local Board of Health Reporting Timeline* (at the end of this manual's introductory section) for information on prioritization and timeliness requirements of reporting and case investigation.

2. **Case Investigation**

a. It is the LBOH responsibility to complete a CDC *Legionellosis Case Report* form (Appendix A) by interviewing the case and others who may be able to provide information. Much of the information required on the form can be obtained from the case's healthcare provider or the medical record.

b. Use the following guidelines to assist you in completing the form:
   1) Accurately record the demographic information and occupation.
   2) The "Possible Sources of Infection" section asks about the case's exposures during the 2 weeks before illness onset. Ask questions about travel history in order to identify where the patient became infected.

3) Provide information regarding "Underlying Disease at Date of Onset" because legionellosis often affects people who have certain conditions or who smoke cigarettes.
4) Complete the "Clinical Illness" section, providing diagnosis, date of symptom onset, whether hospitalized (and associated dates) and outcome of disease. (One use of this section is to distinguish cases of Legionnaires' disease from Pontiac fever, when possible [*e.g.*, x-ray diagnosed pneumonia indicates Legionnaires' disease]).
5) Collect the information requested in the "Method of Diagnosis" section. This information is important in defining a case. You may ask the healthcare provider submit a copy of the medical record to you or enlist his/her aid in completing these sections of the case report form.
6) If you have made several attempts to obtain case information, but have been unsuccessful (*e.g.*, the case or healthcare provider does not return your calls or respond to a letter, or the case refuses to divulge information or is too ill to be interviewed), please fill out the form with as much information as you have gathered. Please note on the form the reason why it could not be filled out completely.

c. After completing the form, attach lab report(s) and mail (in an envelope marked "Confidential") to the MDPH Division of Epidemiology and Immunization, Surveillance Program. The mailing address is:
MDPH, Division of Epidemiology and Immunization
Surveillance Program, Room 241
305 South Street
Jamaica Plain, MA 02130

d. Institution of disease control measures is an integral part of case investigation. It is the LBOH responsibility to understand, and, if necessary, institute the control guidelines listed below in Section 4), Controlling Further Spread.

4) CONTROLLING FURTHER SPREAD

A. Isolation and Quarantine Requirements (*105 CMR 300.200*)

None.

B. Protection of Contacts of a Case

None.

C. Managing Special Situations

Response to a Single Case of Community-Acquired Legionellosis

One case of legionellosis does not require any further investigation other than completing the *CDC Legionellosis Case Report* form. See Section 3) C, Case Investigation. Sporadic cases typically report that they must have gotten the infection from a particular place such as work or their places of worship or recreation. Since *Legionella* can be found in a wide variety of water sources at low levels, unless another case occurs that also implicates the reported "source" it is difficult to prove a particular source was the cause of illness. Alleged sources should not be tested or decontaminated based on one community-acquired case.

Response to Nosocomially Acquired Legionellosis

A laboratory-confirmed case of legionellosis that occurs in a patient who has been hospitalized continuously for $\geq$10 days before the onset of illness is considered a case of nosocomial legionellosis. When a case of nosocomial legionellosis occurs in a hospital or long-term care facility, surveillance efforts for additional cases should be enhanced by the infection control official at the facility. If more cases are identified, measures should be taken to identify the source and eliminate the contamination. See Section 4) D below. Additionally, refer to "Guidelines for Prevention of Nosocomial Pneumonia" in the January 3, 1997 issue of *MMWR* (46:RR-1) for detailed recommendations for responding to nosocomial legionellosis.

Reported Incidence Is Higher than Usual/Outbreak Suspected

If the number of reported cases in your city/town is higher than usual, or if you suspect an outbreak, investigate clustered cases in an area or institution to determine source of infection. A source of infection could be a cooling tower, decorative fountain, whirlpool spa, grocery store mister, etc. If evidence indicates a common source, applicable preventive or control measures should be instituted. Testing water sources is a specialized procedure and will require the assistance of environmental professionals. A confirmed source should be cleaned and decontaminated according to established protocols and a schedule of continued testing must be put in place for a period of time that will be determined on a case-by-case basis. Consult with the epidemiologist on-call at the Division of Epidemiology and Immunization at (617) 983-6800 or (888) 658-2850 for assistance in investigating, testing, cleaning and implementing control measures. The Division can also perform surveillance for cases across town lines and therefore be difficult to identify at a local level.

D. Preventive Measures

To avoid future exposures:

- Cooling towers should be drained when not in use and mechanically cleaned and maintained according to the manufacturer's recommendations.
- Tap water should not be used in respiratory therapy devices.
- Hotels, cruise ships and other owners of whirlpool spas and decorative fountains should maintain them according to the manufacturer's recommendations and keep current on protocols for public health safety.
- After outbreaks, vigilant monitoring of proven sources should be maintained.

A *Legionnaires' Disease Public Health Fact Sheet* can be obtained from the Division of Epidemiology and Immunization or through the MDPH website at <http://www.state.ma.us/dph/>. Click on the "Publications" link and scroll down to the Fact Sheets section.

ADDITIONAL INFORMATION

The formal Centers for Disease Control and Prevention (CDC) surveillance case definition for legionellosis is the same as the criteria outlined in Section 2) A of this chapter. (CDC case definitions are used by the state health department and CDC to maintain uniform standards for national reporting.) For reporting to the MDPH, always use the criteria outlined in Section 2) A.

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